

What is claimed is:

1. A gas distribution cathode for plasma enhanced deposition of semiconductor materials onto one or more webs of substrate material comprising:
 - (a) a cathode body;
 - (b) a process gas distribution system integrated within said cathode body and including process gas outlets which are evenly dispersed on planar surfaces of said cathode body; and
 - (c) one or more gas dispersion plates covering said gas outlets so as to prevent direct, line-of-sight travel of process gas from said gas outlets to a substrate upon which semiconductor material is to be deposited.
2. The gas distribution cathode of claim 1, wherein said process gas distribution system includes at least one primary process gas distribution manifold.
3. The gas distribution cathode of claim 2, wherein said process gas distribution system includes one or more secondary process gas distribution manifolds connected to said primary process gas distribution manifold.
4. The gas distribution cathode of claim 3, wherein said gas outlets are connected to said secondary process gas distribution manifolds.

5. The gas distribution cathode of claim 1, wherein said gas outlets are evenly positioned across two opposite surfaces of said cathode body.

6. The gas distribution cathode of claim 5, wherein said gas outlets are evenly positioned from 1 to 4 inches apart.

7. The gas distribution cathode of claim 6, wherein said gas outlets are evenly positioned from 2 to 3 inches apart.

8. The gas distribution cathode of claim 1, further including a spent gas evacuation system.

9. The gas distribution cathode of claim 8, wherein said spent gas evacuation system includes spent gas inlets evenly positioned along at least one peripheral edge of said cathode body.

10. The gas distribution cathode of claim 9, wherein said spent gas inlets are connected to a spent gas collection/removal manifold system.

11. The gas distribution cathode of claim 1, wherein said cathode body, said process gas outlets and said gas dispersion plates are formed from a metal or metallic alloy which is nonreactive said process gases.

12. The gas distribution cathode of claim 11, wherein said cathode body, said process gas outlets and said gas dispersion plates are formed from stainless steel.
13. A deposition chamber for the plasma enhanced deposition of semiconductor materials onto one or more webs of substrate material, said chamber including:
 - a gas distribution cathode comprising:
 - (a) a cathode body;
 - (b) a process gas distribution system integrated within said cathode body and including process gas outlets which are evenly dispersed on planar surfaces of said cathode body; and
 - (c) one or more gas dispersion plates covering said gas outlets so as to prevent direct, line-of-sight travel of process gas from said gas outlets to a substrate upon which semiconductor material is to be deposited.
14. The deposition chamber of claim 13, wherein said process gas distribution system includes at least one primary process gas distribution manifold.
15. The deposition chamber of claim 14, wherein said process gas distribution system includes one or more secondary process gas distribution manifolds connected to said primary process gas distribution manifold.
16. The deposition chamber of claim 15, wherein said gas outlets are connected to said secondary process gas distribution manifolds.

17. The deposition chamber of claim 13, wherein said gas outlets are evenly positioned across two opposite surfaces of said cathode body.

18. The deposition chamber of claim 17, wherein said gas outlets are evenly positioned from 1 to 4 inches apart.

19. The deposition chamber of claim 18, wherein said gas outlets are evenly positioned from 2 to 3 inches apart.

20. The deposition chamber of claim 13, wherein said cathode further including a spent gas evacuation system.

21. The deposition chamber of claim 20, wherein said spent gas evacuation system includes spent gas inlets evenly positioned along at least one peripheral edge of said cathode body.

22. The deposition chamber of claim 9, wherein said spent gas inlets are connected to a spent gas collection/removal manifold system.

23. The deposition chamber of claim 13, wherein said cathode body, said process gas outlets and said gas dispersion plates are formed from a metal or metallic alloy which is nonreactive said process gases.

24. The deposition chamber of claim 23, wherein said cathode body, said process gas outlets and said gas dispersion plates are formed from stainless steel.

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